

A COMPARISON OF THE EFFECTS OF TWO LEARNING  
MEDIA ON LEARNING, KNOWLEDGE RETENTION AND ATTITUDE

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**A COMPARISON OF THE EFFECTS OF TWO LEARNING MEDIA ON  
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An Abstract of a Thesis by

Lynn Alt Howard

April 1992

Advisor: Barbara Haag, Ph.D., R.N.

The Problem. The purpose of this study was twofold: one, to determine if there was a difference in learning and knowledge retention of healthcare terminology between beginning nursing students in a diploma school of nursing who used computer assisted instruction (CAI) and those who used videotape; and two, to determine if there was a significant positive correlation between student attitude toward CAI or videotape and scores on the posttest.

Procedure. Beginning nursing students were randomly assigned to either a group receiving CAI or to a group receiving videotape to learn healthcare terminology. Three weeks later, they took a posttest covering this content and completed an attitudinal survey about the learning medium which they used. Two months later, they responded to 20 questions on healthcare terminology found in a final examination.

Findings. There were no significant differences found between the students receiving CAI or videotape in learning and knowledge retention. There was no significant correlation found between student attitude toward the learning medium used and scores received on the posttest in either group. Significant correlations between individual items on the attitudinal survey and scores on the final examination were found.

Conclusions. CAI and videotape are both appropriate adjuncts for nursing faculty to use since students in both the CAI and the videotape groups adequately learned the content on healthcare terminology and retained the content at a two month time period.

Recommendations. Recommendations for future research include replication of the study using different content or a larger sample and an investigation measuring knowledge retention after an extended period of time.

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## CHAPTER 1

### Dimensions of the Problem

In the setting at which this study took place, beginning nursing students were required to independently complete a portion of their first nursing course, content on healthcare terminology. In the past students watched videotapes to meet this requirement. The school then purchased computers and software packages addressing healthcare terminology. This study was done to determine if there was a difference in learning and knowledge retention between students who used computer assisted instruction (CAI) and those who viewed the videotapes. In addition, student attitudes toward the learning medium used were correlated with the scores they received on their healthcare terminology posttest.

Kolb's experiential learning model provided the theoretical basis for this study. Kolb (1986) proposed that learning occurred in four stages. He further proposed that there are four learning styles. Each individual shows a preference for one of these four learning styles although more than one style may be used in learning. Kolb's experiential learning model



will be discussed further in Chapter 2.

Kolb (1986) asserted that computer and video technology are conducive to the experiential learning process. These methods of learning allow abstract concepts to become "real" to the learner. Computers and videotapes offer the learner simulations of experiences that, before its advent, could only be obtained through "real-life" situations. Computer technology, by encouraging action on the concepts presented, allows learners to commit themselves to ideas and to accept the responsibilities for the consequences of the decisions of that behavior. Knowledge therefore becomes personalized to the learner.

Computer assisted instruction (CAI) has been found to be comparable to lecture in knowledge retention in a variety of studies (Gaston, 1988; Schleutermann et al., 1983; Van Dongen & Van Dongen, 1984; Yoder & Heilman, 1985). Several studies have shown an increase in knowledge and knowledge retention through the use of CAI (Pogue, 1982; Reynolds & Pontious, 1986; Thiele, 1986). No studies could be found which report a decrease in learning through the use of CAI when

compared to other instructional methods.

Student attitudes toward the usage of CAI have yielded mixed results. Gaston (1988), Van Dogen & Van Dogen (1984) and Koch, et al. (1990) conducted studies which indicated favorable attitudes. Several studies reported finding no student preference as to method of instruction (Jacobson et al., 1989; Schleuterman et al., 1983). Negative attitudes toward CAI were found by Brudenell & Carpenter (1990) and Day & Payne (1984).

While studies which have been conducted have shown fairly consistently that the computer offers the student the same or increased learning, these studies have been conducted on baccalaureate and graduate nursing students only. This researcher could not find current literature which examined the effects videotapes exert on learning, or on student attitudes toward videotapes. With the increase in usage of the computer and videotapes in the educational setting, it is vital that the effects, both short term and long term, of CAI and videotapes on other student populations receive further study. Results of this study added to the data base regarding the short term effects CAI and videotape have on learning, knowledge

retention and attitudes of diploma nursing students.

#### Statement of Purpose

The purpose of this study was twofold: one, to determine if there was a difference in learning and knowledge retention of healthcare terminology between beginning nursing students in a diploma school of nursing who used computer assisted instruction (CAI) and those who used videotape; and two, to determine if there was a correlation between student attitude toward CAI or videotape and scores on the posttest.

#### Research Hypotheses and Rationale

The following research hypotheses were investigated.

1. There will be a difference in learning between beginning nursing students who use CAI and those who use videotape.

Rationale: Learning is enhanced when the student can use more than one sense. Computers and videotapes allow the student to learn through the senses of sight and sound. However they each differ in the amount of involvement of the senses of sight and sound the student is allowed.

2. There will be a difference in knowledge

retention between beginning nursing students who use CAI and those who use videotape.

Rationale: Learning utilizing the experiential learning model allows the student to effectively conceptualize and commit to abstract concepts. With the conceptualizing of the abstract concepts the student can internalize these ideas which will allow for greater retention over time. While the computer and videotapes are both conducive to the experiential learning process, they vary in the amount of interaction the student is allowed with the learning medium.

3. There will be a significant positive correlation between student attitude toward the learning medium and scores on the posttest.

Rationale: If a student has a favorable attitude toward the learning medium and the subject being studied, he or she is more likely to internalize the information being studied thereby increasing knowledge.

#### Definition of Terms

The following definition of terms were used in this study:

1. Healthcare terminology refers to the special

terms and language used by members of the healthcare professions. Healthcare terminology were the terms found on the CAI and videotapes, such as tachycardia, postoperative, and antepartum.

2. Computer Assisted Instruction was the process by which the student accessed and interacted with the computer via computer tutorials to gain knowledge of healthcare terminology by simulation and drill and practice sessions. The student worked alone in interacting with the computer.

3. Videotapes of healthcare terminology were magnetic tapes projected onto a television screen that required passive observation by the learner. Videotapes were viewed by the students individually or in small groups of two to four students.

4. Learning was the short term knowledge the student acquired after completing the CAI or videotapes. Learning was the score the student received on the healthcare terminology posttest.

5. Knowledge retention was the ability of the learner to remember and retain material over an extended period of time. Retention was the score the student received on the questions which pertained to

healthcare terminology incorporated into the final examination.

6. Attitude was the student's beliefs and feelings toward the learning medium used. Attitude was measured by the score received on the attitudinal survey, measured after using the learning medium but before completing the posttest.

7. Beginning nursing students were first year nursing students enrolled in their first nursing course at a diploma school of nursing.

#### Significance of the Study

There is a limited research base in nursing education which discusses the effects that CAI and videotape have on student learning. This study added to that research base in the area of the short term effects of CAI and videotape on learning, knowledge retention, and student attitude. There is a void in the research which addresses the effects of CAI and videotape exert on learning and knowledge retention of diploma nursing students. This study addressed this issue specifically.

The results of this study can assist nurse educators in designing courses. Nurse educators can

reevaluate current curriculum to ascertain if any portions of the curriculum can be taught by alternative teaching methods. This would make nurse educators more available to students for such activities as one-on-one instruction and counseling. The results of this study can also aid faculty members in evaluating the effectiveness of alternative teaching methods in student learning.

## CHAPTER 2

### REVIEW OF THE LITERATURE

The purpose of this study was twofold: one, to determine if there was a difference in learning and knowledge retention of healthcare terminology between beginning nursing students in a diploma school of nursing who used CAI and those who used videotape; and two, to determine if there was a significant positive correlation between student attitude toward CAI or videotape and scores on the posttest. In the literature review, an overview of Kolb's experiential learning model is first presented. Previous research regarding the effectiveness of CAI, student attitudes toward CAI, and an overview and previous studies regarding videotapes are then discussed. A summary of the literature review ends the chapter.

#### Kolb's Learning Model

The theoretical basis for this study was Kolb's experiential learning model. The experiential learning theory takes into account individual differences in learning. There are four elementary styles of learning into which most adults fit. These learning styles, accommodation, assimilation, convergence, and



divergence, represent learning abilities that are opposites. As individuals mature, become socialized, and resolve conflicts they tend to develop a unique learning style that shows a preference of one of these four elementary styles of learning (Kolb, 1984).

The accommodation style relies on concrete experience and active experimentation. This style favors doing things and carrying out tasks and the individual who prefers this style will work best in situations where adaptation to immediately changing situations is required (Kolb, 1984).

The assimilation style relies on abstract conceptualization and reflective observation. Inductive reasoning and creating theoretical models are favored by this style. The individual favoring this style is more concerned with ideas and abstract concepts rather than people and practicality (Kolb, 1984).

The convergence style relies on abstract conceptualization and active experimentation. Strengths seen in this style are decision making, problem solving and practical application. This person likes tasks and problems, preferably those with just

one answer (Kolb, 1984).

The divergence style relies on concrete experience and reflective observation. Strengths seen in this style are imaginative abilities and the awareness of meaning and values. This individual will do best in emotional, people-centered situations and does well in brainstorming sessions (Kolb, 1984).

The learner in this model requires four capabilities to be effective: 1) concrete experience of a learning situation; 2) reflective observation skills of the learning experience; 3) abstract conceptualization about the meaning of what has occurred; and 4) active experimentation about what has been observed, experienced, or conceptualized. The learner is entering into new experiences without bias, reflecting and interpreting these experiences from different perspectives, creating concepts that integrate these observations into logically sound theories, and then using these theories in decision making and problem solving in new experiences (Kolb, 1986).

#### Computer Assisted Instruction

Previous studies conducted in comparing learning

and knowledge retention of nursing students using CAI and classroom instruction have yielded fairly consistent results. The majority of the studies revealed CAI to be as effective as other means of instruction while a few have demonstrated increased learning through the use of CAI.

Gaston (1988) compared the effects of CAI and lecture upon knowledge and knowledge retention in generic and RN articulation baccalaureate nursing students in a nursing research course. Students were randomly assigned to either the CAI or lecture group. The CAI group of 19 students used an interactive tutorial while the lecture group of 24 students had the same content presented via lecture and overhead transparencies. Software access was limited to the CAI group. Both groups were tested twice, Phase I immediately after material presentation to test knowledge and Phase II 8 months later to test knowledge retention. Results were analyzed by t-test and showed no significant difference in knowledge and knowledge retention between the CAI and lecture groups (Gaston, 1988).

Yoder and Heilman (1985) reported results similar

to those of Gaston. The purpose of their study was to determine if increased knowledge would be demonstrated after completion of a computer assisted tutorial on nursing diagnoses, as evidenced by performing significantly better on a posttest than a pretest. Seventeen graduate students enrolled in their first semester of Medical-Surgical, Geriatrics, and Community Health courses were the subjects in this study. Knowledge was measured by comparing pretest and posttest scores. Results, analyzed through the use of paired t-tests at an alpha level of .001, suggested that students learned the material with the computer assisted tutorial. These results did not imply that the computer method is a better teaching technique than the traditional lecture method.

Neil (1985) also reported no significant differences in learning when comparing CAI with written text materials. Two groups of second semester generic baccalaureate nursing students were tested over professional nursing functions, the experimental group receiving CAI only while the control group received written text materials only. An experimental design was used with the two groups tested for learning on a

pretest/posttest basis. Thirty-two students participated in the study, with half randomly assigned to each group. ANCOVA, t-tests, and chi-square were used to determine statistical significance at  $p > .05$ . No significant difference in learning was reported, but students reported preferring the CAI method of learning.

Use of computer simulations was studied as a means to measure decision-making skills of 64 senior baccalaureate nursing students who were randomly assigned to an experimental or control group. The experimental group received CAI appropriate to their clinical area, while the experimental group did not receive CAI. All students were given a pretest and posttest. Statistical tests used to analyze data included t-tests to determine change in pre-post test scores and Pearson Correlation to determine correlation between clinical grade and posttest scores. Results reported no differences in learning between the experimental and control groups. (Lowdermilk and Fishel, 1991).

Similar to the previously mentioned studies, Day and Payne (1987) reported no significant differences in

learning when CAI was used. First year baccalaureate nursing students were the subjects in a study to determine if CAI was an effective method by which first year students could learn health assessment concepts. The design was quasi-experimental, using two experimental treatments applied to two groups on two occasions. The experimental treatments were CAI and traditional lecture. Group A consisted of 50 students and group B consisted of 49 students. Descriptive statistics, correlations, and ANOVA were used to determine the effects of the experimental treatments. The study indicated that CAI is as effective as traditional lecture method, as measured by written and practical examination scores.

Huckabay, et. al. (1979) likewise reported no significant difference in learning when CAI was used. To study cognitive, affective, and transfer of learning associated with CAI, thirty-one graduate students enrolled in a primary care course were assigned to an experimental or control group. The experimental group of 14 students received CAI while the control group of 17 students were taught by the traditional lecture and discussion method. Groups were studied one year apart.

A pretest was given to determine knowledge level of the students prior to institution of the study. Each group took three tests: cognitive learning, transfer of learning, and affective behaviors. The first two were administered as pretest/posttest while the last was administered as posttest only. Data were analyzed by means of t-test significant at  $p < .05$ . No significant differences between the groups were reported (Huckabay, et. al., 1979).

Several studies have reported an increased competency rate with the use of CAI over lecture, laboratory simulation, peer tutor, and faculty conferences (Thiele, 1986; Reynolds & Pontious, 1986; Pogue, 1982). Thiele (1986) studied forty-six juniors in their beginning nursing class to see if there was a difference in performance between students taught by lecture and students taught by CAI. Subjects in the research group (those receiving CAI) did not have class time devoted to content on drug calculations. Each group received the same criterion-referenced test on drug calculations. Findings revealed that students receiving CAI attained a higher success rate on the drug dosage test than did the other comparison groups.

Reynolds and Pontious (1986), like Theile (1986), reported an increase in student grades when comparing CAI to other instructional methods. In learning and mastering medication dosage calculations, baccalaureate nursing students were given lecture content and then encouraged to use one or all of the supplemental learning activities of CAI, faculty conferences, simulation laboratory, or peer tutors to increase their competencies. Records were kept of the number of times students used each supplemental activity before each competency test. Competency test I was given two weeks after class content was presented and competency test II was given to those students who did not achieve mastery on the first test two weeks later. Percentages and chi-square analysis were used to analyze the data. More students chose CAI over other supplemental learning activities and the students using CAI scored significantly higher on examinations (Reynolds & Pontious, 1986).

Pogue (1982), like Reynolds and Pontious, reported CAI to be more effective in facilitating learning. The effectiveness of CAI in continuing education was evaluated in this study. The education department of a



teaching hospital developed CAI lessons on drug therapy to be utilized by newly employed nurses in the orientation program of the hospital. Twenty-seven newly employed nurses were placed into either the experimental group receiving CAI or the conventional group receiving lecture. T-test was used to compare pretest and posttest scores of the two groups. The experimental group scored significantly higher on the posttest than the conventional group ( $p < .001$ ).

Rickelman, et. al. (1988) explored the effects of using a computer video-interactive system (CVIS) regarding therapeutic communication on senior baccalaureate nursing students' learning and anxiety in the psychiatric clinical setting. Seventy-five students were randomly assigned into two groups, group I received lecture and CVIS while group II received the same lecture and a videotape. Group I scored significantly higher ( $p < .001$ ) than group II on a posttest measuring therapeutic communications. This study took the form of a quasi-experimental, pretest, posttest design. No significant difference in anxiety was reported between the two groups.

### Student Attitudes

Studies that elicited student attitudes toward CAI and compared attitudes toward CAI with other learning media yielded fairly consistent results. Studies that reported a favorable student attitude toward CAI include those of Van Dogen and Van Dogen (1984) and Koch, et al (1990). Indifferent attitudes toward CAI were found by Lowdermilk and Fishel (1991) and Schleutermann et al (1983). One study was found which reported solely negative attitudes toward CAI (Day and Payne, 1987).

Van Dogen and Van Dogen (1984) surveyed undergraduate students regarding their attitudes toward computer simulations related to administration of antipsychotic medications. Student responses were overwhelmingly positive. Ninety-five percent stated that they would like to receive similar learning experiences in the future; 85% preferred CAI due to the positive and immediate feedback received throughout the unit. The students believed that this facilitated learning and helped them to retain the information longer.

Koch, et al (1990) likewise reported favorable

student responses regarding the use of the computer. Diploma students were questioned regarding their affective responses to learning via computer assistance. While the students offered suggestions to be used in further experiences with the computer, the majority of the responses (65%) were favorable. The main advantage seen was the self-paced nature of the computer as a learning tool. The students liked the feeling of having a one-on-one relationship with the computer which was achieved through the feedback that the computer offers continuously throughout the program. Computers also offered the advantage to the students of being available when needed, as compared to instructors who have other time constraints making it difficult for the student to get one-on-one instruction whenever they wish. The fostering of critical thinking skills was another advantage of the computer cited by the students. Student perceptions of disadvantages of the computer were non-human interaction and deficiencies in the software.

Lowdermilk and Fishel (1991) explored baccalaureate nursing student attitudes toward CAI simulations as a learning activity. They received a

mixture of positive and negative responses. After completion of CAI usage, the students completed a thirty-six item attitudinal and evaluative questionnaire which was developed by the researchers. Advantages identified were that the computer made learning fun, provided immediate feedback, expanded their knowledge base, and allowed the students to experiment and make clinical decisions without the worry of harming their patients. The drawbacks of CAI were seen to be waiting for computer time, accessing the program, unclear instructions, not enough feedback for wrong answers, and being time consuming.

Schleutermann et al. (1983) found results that conflicted with findings of Lowdermilk and Fishel (1991). Graduate nursing students' attitudes toward CAI and paper-and-pencil simulations were studied. No difference in attitudes between the two learning mediums was reported. The students liked the immediate feedback that the CAI offered them and perceived that the CAI was more time efficient. A disadvantage of the CAI was the waiting for access to a computer terminal and inability to conveniently take a computer home.

The only study found which reported uniformly

unfavorable student attitudes was conducted by Day and Payne (1987). To determine if there was a difference in learner attitude toward CAI and traditional lecture method, an Attitude Questionnaire was given to the first year baccalaureate students at the completion of their learning modules on health assessment. The questionnaire used a semantic differential scale, rating items on a seven point bipolar scale. These students did not rate the CAI as a valuable or an enjoyable learning experience. The students found the CAI to be less useful, less appropriate, less stimulating, more disturbing, less enjoyable, less accurate, less satisfying, and ineffective. Forty-six percent of the students wanted to see less or no CAI in the curriculum.

### Videotapes

This section will address an overview of videotapes, the use of videotapes to decrease anxiety, and advantages and disadvantages of videotapes. This researcher was unable to find studies investigating learning via the medium of videotapes.

Videotapes are adjuncts to the teaching process. Retention of knowledge is believed to be enhanced

through the use of videotapes since individuals remember 10% of what is heard and 20% of what is seen (DeYoung, 1990).

Heinich et al. (1989) sees the use of instructional videotapes widely increasing among schools and institutions of higher learning. This is due to several factors. There is a rapid spread in video recording. Many schools and colleges are able to afford their own video equipment to produce their own video productions. The increase in video recording has caused a subsequent increase in the quality and availability of videotape programs. High quality videotape programs are now available in a wide variety of subject areas.

Eighty percent of higher education institutions in 1986 were using videotape to some degree. Most of these institutions used prerecorded videotapes. Videotapes are also being increasingly utilized in meeting the needs of off-campus students. For the off-campus student, videotapes can decrease traveling expenses by offering link programs at off-campus sites. Videotapes in higher education are being used also to meet the needs of the working adult taking courses.

The videotapes can offer a degree of flexibility to the schedule of the adult learner (Heinich et al., 1989).

DeYoung (1990) described the nature and usefulness of videotapes. Speakers can be taped to be played back at later dates, and demonstration of skills and procedures can be taped and saved for future viewings. Videotapes assure that if many groups are to view the content, this content can be repeated with consistency over time. Videotapes are a means to bring situations to the learner that the learner might otherwise not have the opportunity to observe. Complex clinical situations can be videotaped and brought into the classroom for discussion and critique. Videotapes which are time lapsed can allow the student to observe situations which would normally take years to transpire. The videotape therefore serves as a means to bring situations into the classroom that are more lifelike to the student.

Scheinblum (1987) used a videotape to decrease anxiety in baccalaureate nursing students as they began a clinical rotation in the infant special care unit. A videotape was made of a nursing student actually caring for infants during a clinical day. The students were

able to view the unit and nursing measures prior to actually beginning their clinical experience. Student comments about the use of the videotape were overwhelmingly positive. The students perceived that the videotape offered them an in-depth orientation which decreased their anxiety level.

DeYoung (1990) listed advantages and disadvantages of videotapes. Advantages include: allowing the speaker on tape to maintain eye contact with the audience, even though it is not a live presentation, enhancing realism through motion pictures, assuring identical content for multiple viewings, and allowing for reviewing by students requiring extra study. Disadvantages include: passive receiving of information due to one-way communication and high equipment and maintenance costs.

Heinich et al. (1989) identified advantages and disadvantages in addition to those presented by DeYoung (1990). Through the ability to manipulate space and time, videotapes have the advantage of being able to portray motion and processes. This allows the student to safely observe events that could be dangerous in a real life setting and to learn skills through



observation. Disadvantages include the fixed pace and possible misinterpretation of presented material.

#### Summary

The findings of the studies comparing CAI with other instructional methods have elicited fairly consistent results. Gaston (1988), Yoder and Heilman (1985), Neil (1985), Lowdermilk and fishel (1991), Day and Payne (1987) and Huckabay, et al (1979) reported no difference in learning when comparing CAI with other learning media. Thiele (1986), Reynolds and Pontious (1986), Pogue (1987) and Rickelman et al. (1988) reported increased competency rates in students using CAI. No studies reported a decrease in learning through the use of CAI.

Student attitudes toward CAI were generally favorable. Van Dogen and Van Dogen (1984) and Koch et al. (1990) reported favorable student attitudes toward the use of CAI. Lowdermilk and Fishel (1991) and Schleutermann et al. (1983) reported mixed student attitudes toward the use of CAI. Day and Payne (1987) reported negative student attitudes toward the use of CAI.

Recent studies pertinent to this study involving

audiovisual aids were not found in the literature. DeYoung (1990) described the nature and use of videotape and listed advantages and disadvantages of videotape. Heinich et al. (1989) also described advantages and disadvantages of videotape, as well as use of videotape in higher education. Scheinblum (1987) described the use of a videotape to decrease student anxiety before entering into the clinical setting.

There was a void in the literature regarding the effects of CAI and videotape on learning and knowledge retention of diploma nursing students, previous studies were conducted using primarily baccalaureate and masters students. While studies were conducted eliciting student attitude toward CAI, these attitudes were not correlated with the learning acquired through CAI. Studies could not be found eliciting student attitudes toward videotapes. This research study was therefor appropriate.

### CHAPTER 3

#### METHODOLOGY

The purpose of this study was twofold: one, to determine if there was a difference in learning and knowledge retention of healthcare terminology between beginning nursing students in a diploma school of nursing who used CAI and those who used videotape; and two, to determine if there was a significant positive correlation between student attitude toward CAI or videotape and scores on the posttest. In this chapter the design, independent variable, dependent variable, tool measuring attitude, setting, subjects, data gathering procedures, and protection of human rights are discussed.

#### Design of the Study

This study took the form of a quasi-experimental and correlational design. Polit and Hungler (1987) define quasi-experimental designs as those that involve manipulation of an independent variable. Quasi-experimental designs lack either randomization or a control group. The quasi-experimental design for this study can be diagramed as follows:

$$\begin{array}{l} X_1 \ O_1 \ O_2 \\ X_2 \ O_1 \ O_2 \end{array}$$

$X_1$  = CAI group  
 $X_2$  = videotape group  
 $O_1$  = posttest  
 $O_2$  = final examination

Two groups were exposed to an independent variable. The first observation was the posttest that occurred at three weeks, the second observation was the final examination, that occurred at two months. In this study there was no control group. Polit and Hunger (1987) define correlation research as that which attempts to show interrelationships between two variables. The correlation between student attitudes toward the learning medium used and scores on the posttest were studied.

#### Independent Variable

Two treatments were used in this study, the CAI program on healthcare terminology and videotapes on healthcare terminology. Each are described.

The CAI program was entitled Medical Terminology Made Easy published by Health Sciences Consortium. It was an interactive computer program that taught the student prefixes, combining forms and suffixes thereby allowing the student to understand healthcare

terminology. The program encouraged correct usage of these word parts. The program consisted of eight individual units. The student received detailed feedback on both correct and incorrect responses. The time required to complete the program was varied depending on the individual's responses and the amount of time the individual wished to spend reviewing concepts within the program.

The school of nursing at which this study took place introduced the computer as a learning medium for the first time in the fall semester of 1991. A computer committee comprised of six persons, including this researcher, was responsible for evaluating, purchasing, and assisting other nursing faculty in integrating the use of computer software into the nursing curriculum.

The computer laboratory in which the students accessed the CAI was composed of nine workstations. Each computer workstation consisted of an IBM P/S 2 which was linked with a Novel 286 file server. A resource person was available to answer student questions regarding the computer software and to assist the student in accessing the system. The computer

laboratory was open during weekdays and one evening a week.

The videotape series Medical Terminology by the Dean Vaughn Learning Systems taught the student to learn healthcare terminology by association. The series consisted of 12 tapes, each approximately twenty minutes in length. Students were taught prefixes, suffixes, and combining forms.

The students viewed the videotapes in the hospital library which was located approximately six blocks from the school. The library was open Monday through Friday from seven A.M. until five-thirty P.M. There was a resource person available to assist students in accessing the audiovisual equipment.

The faculty reviewed test questions and determined that the CAI and videotapes addressed test content. No lecture time was given to healthcare terminology.

#### Dependent Variable

Two dependent variables were analyzed in this study, learning and knowledge retention. Learning was measured by a posttest on healthcare terminology given upon completion of the unit of study. The healthcare terminology posttest (Appendix A) was a teacher made

tool and consisted of one hundred short answer and multiple choice questions. These questions involved rote learning by the student, the type of learning needed by the beginning nursing student just mastering healthcare terminology.

The posttest was reviewed by nurse educators expert in this area of study who concurred that content validity was present. The odd-even technique was used to determine reliability. Subjects were third semester nursing students who had completed this course of study in the fall of 1990. The odd-even reliability coefficient was .899, which reveals a highly dependable relationship.

Knowledge retention, the second independent variable, was measured by 20 healthcare terminology questions (Appendix B) found on the final examination which was taken two months after completion of the posttest. The final examination evaluated application in addition to recognition of healthcare terminology.

The 20 healthcare terminology questions on the final examination were reviewed by two nurse educators. The nurse educators concurred that content validity was present. The odd-even technique was used to determine

reliability. Subjects were fifth semester nursing students who had completed this course of study the fall of 1989. The odd-even reliability was .345. Koenker (1974) states that this reflects a slight relationship. This may be accounted for by one question in the odd half which was answered incorrectly by 70% of the respondents. This question was, "Which of the following refers to an inflammation of the tongue?" The majority of the respondents answered stomatitis while the correct answer was glossitis. The students included in determining reliability had completed this course of study two years before. The use of the term glossitis is uncommon in the healthcare setting. As a result the mean score for questions in the odd half was 8.8 and the mean score for questions in the even half was 9.7.

#### Tool Measuring Attitude

Attitude toward the learning medium used was correlated with scores received on the posttest. Attitude was measured just prior to student completion of the posttest. The attitudinal survey (Appendix C) was a teacher made tool measuring 8 attitudes: understandability of the learning medium, enjoyability



in using the learning medium, convenience of the learning medium, pacing of information presented in the learning medium, perceived effectiveness of the learning medium, helpfulness of the learning medium in facilitating learning, recommendation of the learning medium to future students, and the desire to see more of this type of learning medium used in the future. These attitudes were measured on a five point Likert scale. A high score indicated favorable attitudes. Space was provided for additional student comments on the most and least liked aspect of the learning medium at the end of the survey.

Two educators reviewed the tool for validity and concurred that content validity was present. Former students completed the survey to determine if the tool was reliable. The correlation coefficient obtained using the split-half technique was .911. The students also confirmed that the survey was understandable.

#### Setting

This study took place in a diploma school of nursing at a large midwestern medical center. The school of nursing enrolled one hundred and eight new students for the 1991-1992 year, making a total student

body of two hundred students. The school is accredited by the Iowa Board of Nursing and the National League for Nursing. The curriculum at the school is five semesters long.

### Subjects

Subjects in this study were beginning nursing students enrolled in their first nursing class Nursing Fundamentals 100, a four credit hour course. Healthcare terminology was a portion of this larger course. Students were given a pretest on healthcare terminology. Those scoring less than 85% were required to independently complete this portion of the course using CAI or videotapes. A three week period was allotted for completion.

Ninety-eight of 106 beginning nursing students received less than 85% on the pretest. Of these 98 students, 51 (52%) agreed to participate in this study. These 51 students were randomly assigned to either the CAI or videotape group. The random assignment was stratified according to previous college credit, ie., no college credit, one to six college credits, and more than seven college credits to obtain a more representative sample. During the course of the

research study, five subjects withdrew from the CAI group, and fourteen from the videotape group. One subject switched groups and was withdrawn from the study. While the precise reason for the 19 dropping out is unknown, verbal comments revealed that some withdrew because they did not wish to use the videotapes and others because they did not wish to complete the attitudinal survey. This left 31 subjects, 20 in the CAI group, and 11 in the videotape group.

A demographic data collection tool (Appendix D) was administered to the subjects at the time of assignment into their designated group. This tool obtained information regarding age, gender, place of residence, and previous computer experience. The demographic data are presented in Table 1.

#### Data Gathering Procedure

The researcher described the study to Nursing Fundamentals 100 faculty and their cooperation was obtained. The researcher described the study to students in Nursing Fundamentals 100. Those agreeing to participate signed the consent form and completed the demographic questionnaire. After the researcher

Table 1 DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE

VARIABLES	CAI	Videotape	n	PERCENT
<b>SEX</b>				
Male	3	2	5	16.1
Female	17	9	26	83.8
<b>AGE</b>				
18-20	7	2	9	29.0
21-25	5	4	9	29.0
26-30	4	3	7	22.6
31-35	2	2	4	12.9
36-40	1	0	1	3.2
41-45	1	0	1	3.2
<b>PLACE OF RESIDENCE</b>				
Dormitory	6	2	8	25.8
Local	11	6	17	54.8
Out of town	3	3	6	19.3
<b>PREVIOUS COMPUTER EXPERIENCE</b>				
Yes	17	5	22	70.9
No	2	1	3	9.6
Limited	2	2	4	12.9
Missing	0	2	2	6.4
<b>PREVIOUS COLLEGE CREDITS</b>				
0	7	3	10	32.2
1-6	6	5	11	35.5
>7	7	3	10	32.2

stratified randomly assigned the students to the CAI or videotape group, students were given course materials related to study of healthcare terminology. The posttest on healthcare terminology was taken three weeks later. The attitudinal survey toward the learning medium was completed just prior to taking the posttest. Two months later the final examination was

given. Twenty of the 100 questions on the final examination included healthcare terminology.

#### Protection of Human Rights

Permission to conduct the study was granted by the Drake University Human Subjects Committee (Appendix E) and the appropriate persons at the school of nursing. The researcher met with the students and gave them an introductory letter (Appendix F) which explained the purpose of the study, the nature of participation, how confidentiality would be preserved and of what consent consisted. The letter also indicated how to contact the researcher for questions or concerns and how to obtain results of the study. The letter assured the students that participation, or failure to participate, would not affect their course grade in any way.

## Chapter 4

### RESULTS

The purpose of this study was twofold: one, to determine if there was a difference in learning and knowledge retention of healthcare terminology between beginning nursing students in a diploma school of nursing who used CAI and those who used videotape; and two, to determine if there was a significant positive correlation between student attitude toward CAI or videotape and scores on the posttest. The Mynstat computer program was used for analysis. An alpha level of 0.05 was established.

#### Hypothesis Testing

Hypothesis one stated: There will be a difference in learning between beginning nursing students who use computer assisted instruction and those who use videotape. The independent t-test revealed no significant difference in learning between the two groups,  $t = 0.970$ ,  $df = 29$  (Table 2). The hypothesis was not supported. The mean correct score on the posttest of those who used CAI was 91.950 while the mean correct score on the posttest of those who watched videotapes was 89.545.

Table 2      DIFFERENCES IN LEARNING:    CAI AND VIDEOTAPE				
	Mean Score	<u>t</u>	<u>df</u>	<u>p</u>
CAI	91.950	0.970	29	.340
Videotape	89.545			

Hypothesis two stated: There will be a difference in knowledge retention between beginning nursing students who use CAI and those who use videotape. The independent t-test revealed no significant difference in knowledge retention between the two groups,  $t = 1.225$ ,  $df = 29$  (Table 3). The hypothesis was not supported. The mean correct score on the final examination of those who used CAI was 93.000 while the mean correct score on the final examination of those who used videotapes was 95.909.

Table 3      DIFFERENCES IN KNOWLEDGE RETENTION: CAI AND VIDEOTAPE				
	Mean Score	<u>t</u>	<u>df</u>	<u>p</u>
CAI	93.000	1.225	29	.230
Videotape	95.909			

Hypothesis three stated: There will be a positive

correlation between student attitude toward the learning medium and scores on the posttest. The Spearman rho correlation on both learning media between student attitude and posttest scores was not significant, CAI group  $p = -.419$  (Table 4). The mean attitude score of the CAI group was 31.7 and the mean attitude score of the videotape group was 28.8. The hypothesis was not supported.

Table 4      ATTITUDE CORRELATION: CAI AND VIDEOTAPE

	<i>p</i>
CAI posttest score	.149
Videotape posttest score	-.419

#### Additional Findings

Correlations between the score of each question on the attitudinal survey and posttest and final examination scores were determined for both the CAI group (Table 5) and the videotape group (Table 6). There were more significant positive correlations between CAI and attitude than between videotape and attitude.

The first attitude was "I was able to understand



Table 5 CORRELATION MATRIX FOR CAI GROUP

Variables		
Variables <sup>1</sup>	Posttest	Final Examination
ATTCAI	.149	*.569
ATT1	*.444	*.564
ATT2	-.072	*.432
ATT3	.081	*.387
ATT4	.064	.191
ATT5	.086	.148
ATT6	-.071	.257
ATT7	.179	*.625
ATT8	.087	*.461

<sup>1</sup>ATTCAI = Total attitude survey score; ATT1 = understandability; ATT2 = enjoyability; ATT3 = convenience; ATT4 = pacing; ATT5 = knowledge competency; ATT6 = future use of CAI; ATT7 = recommending CAI to other students; ATT8 = CAI helped increase learning.

\* $p < .05$

the material presented." The CAI group had a positive significant correlation between this attitude and the posttest score,  $p = .444$  and this attitude and the final examination score,  $p = .564$ .

The second attitude was "This learning medium was enjoyable to use." The CAI group had a significant positive correlation between this attitude and the final examination score,  $p = .432$ .

The third attitude was "This was a convenient learning medium to use." The CAI group had a significant positive correlation between this attitude

Table 6 CORRELATION MATRIX FOR VIDEOTAPE GROUP

Variables		
Variables <sup>1</sup>	Posttest	Final Examination
ATTVT	-.419	-.314
ATT1	-.102	.249
ATT2	-.259	.140
ATT3	-.451	-.319
ATT4	-.206	-.233
ATT5	-.189	*-.593
ATT6	-.210	.011
ATT7	-.424	-.356
ATT8	.000	-.250

<sup>1</sup>ATTVT = Total attitude survey score; ATT1 = understandability; ATT2 = enjoyability; ATT3 = convenience; ATT4 = pacing; ATT5 = knowledge competency; ATT6 = future use of videotape; ATT7 = recommending videotape to other students; ATT8 = videotapes helped increase learning.

\* $p < .05$

and scores on the final examination,  $p = .387$ .

The fifth attitude was "I believe I am competent in my knowledge of healthcare terminology after using this learning medium." The videotape group showed a significant negative correlation when final examination scores were compared,  $p = -.593$ .

The seventh attitude was "I would recommend this learning medium to other students." The CAI group showed a significant positive correlation between this attitude and scores on the final examination,  $p = .625$ .

The eighth attitude was "I believe this learning

medium helped me learn." There was a significant positive correlation in the CAI group between this attitude and scores on the final examination,  $p = .461$ . In comparing attitudinal survey scores and final examination scores, the CAI group had a significant positive correlation,  $p = .569$ .

Student comments related to likes and dislikes of the learning medium used were also identified. Dislikes of the computer centered primarily around one area, i.e., decreased availability of the laboratory for student use. For example, 15 of the 20 students (75%), made comments similar to the following: "The time available in the lab was most often an inconvenience to my schedule". Likes of the computer centered primarily around two areas, self-pacing and fun to use. Seven of the 20 students' (35%) comments were similar to the following, "I could go at my own pace. Four of the 20 students (20%) made comments similar to the following, "Fun, easy and enjoyable".

Student dislikes of the videotapes centered primarily around the area of length of time required to complete the course. Seven of the 11 students' (63%) comments were similar to the following: "The pace of

the tapes was slow and monotonous". Student likes regarding the videotapes centered primarily around the ease in understanding them. Six of the 11 students' (54%) comments were similar to the following, "It was an easy learning tool".

## CHAPTER 5

### DISCUSSION OF THE RESULTS

The purpose of this study was twofold: one, to determine if there was a difference in learning and knowledge retention of healthcare terminology between beginning nursing students in a diploma school of nursing who used CAI and those who used videotape; and two, to determine if there was a significant positive correlation between student attitude toward CAI or videotape and scores on the posttest. In this chapter, a discussion of the findings, applications of these findings for nursing, limitations of the study, and recommendations for future research on the effects of CAI and videotape on learning, knowledge retention, and attitude are found. The chapter concludes with a summary of the study.

#### Discussion of Findings

Findings of this study are discussed and compared to other studies. Kolb proposed that learning occurs in four stages (capabilities). Kolb believed that CAI and videotape are conducive to the experiential learning process. The findings of this study support Kolb's proposition. Students in both the CAI group and

the videotape group sufficiently learned healthcare terminology as evidenced by passing scores received on the posttest.

It was hypothesized for this study that there would be a difference in learning and knowledge retention of healthcare terminology between students who used CAI and those who used videotapes. This study found no differences in learning between the two groups. These findings were similar to those of Gaston (1988), Yoder and Heilman (1985), Neil (1986), Lowdermilk and Fishel (1991), Day and Payne (1987), and Huckabay et. al. (1979), all reporting no differences in learning when comparing CAI to other instructional methods. The subjects of four of these studies were baccalaureate nursing students, subjects of one study were graduate nursing students, and subjects of the sixth study were baccalaureate and graduate nursing students. The subjects in this study were diploma nursing students. It can be hypothesized that the type of nursing education does not make a difference in student learning.

All of the studies above tested content that was abstract and complex in nature. In this study, the

content of healthcare terminology was concrete. Students learning both abstract and concrete types of content responded similarly to CAI, videotape, and other instructional methods. The possibility exists that if more abstract information had been presented, a difference in learning and knowledge retention might have been seen between the two learning media. The course content presented in this study was tested at the recognition level in determining learning. Perhaps videotapes and CAI are equally conducive to learning information at the recognition and recall level. Questions which involved both recognition and application tested knowledge retention two months after completing the posttest. Perhaps two months time is too short of a time period in which to measure knowledge retention.

The findings of this study differed from the findings of Theile (1986), Reynolds and Pontious (1986), Pogue (1982), and Rickelman, et. al. (1988), all reporting significant increases in learning with the use of CAI. The subjects of three of these studies were baccalaureate nursing students and of the fourth, practicing registered nurses. Content to be learned

was concrete in three of the studies, while in the fourth study content was complex and abstract.

The findings of this study were similar to some research but dissimilar to others. The subjects in this study were diploma nursing students while the subjects in the other studies were baccalaureate students, graduate students or practicing registered nurses. The reasons for the disparity in comparing studies might be that students in a diploma program have different learner characteristics and that a diploma program itself possesses different program characteristics. The student in the diploma program is frequently new to post-secondary education. This student perhaps is then more familiar and more comfortable with concrete information. Many students in a diploma program also have families and work outside the home in addition to attending school. Perhaps this, coupled with the student being new to post-secondary education, could have affected the results of this study.

The possibility exists that diploma programs themselves possess certain unique characteristics which could have influenced the results of this study.



Diploma programs are short in length. The educators in these programs must present a large amount of information to the students in a fairly short period of time. Due to the educators in the program needing to present material so quickly, there might be a decrease in the amount of nurturing of students which might be evident in the other programs. This characteristic might influence the way students learn and therefore could possibly have affected the results of this study.

It was hypothesized that there would be a positive correlation between student attitude toward the learning medium and scores on the posttest. None of the studies reviewed correlated attitudes with learning. In this study, there was no significant correlation in the CAI or videotape group between attitude and learning. The videotape group had a negative correlation ( $p = -.419$ ) which was approaching significance. Perhaps students who had a negative attitude toward a learning medium showed an increase in performance on examinations. Perhaps the more negative an experience the individual has, the more likely that individual is to remember that experience and the knowledge that accompanies that experience.

### Implications for Nursing

The results of this study have several implications for the education of nursing students. While there was no difference in learning found between students who used CAI and those who used videotape, the posttest and final examination scores of the students in these two groups clearly indicate that both groups adequately learned the material.

One implication of this study involves the educators' use of time. This study found no differences in learning between the students who used videotapes and those who used CAI. Both of these learning media were satisfactory adjuncts to the teaching-learning process. The nurse educator therefore can assign students to watch videotapes or to interact with the computer and be fairly confident that these learning media will contribute to student learning. While some students are interacting with the computer or watching videotapes, instructor time is then available for students not involved in these activities.

A second implication of this study is that perhaps these learning media can be used with a variety of

nursing content. Ninety percent of the subjects passed the final examination. All subjects, however, passed the content on healthcare terminology found on the final examination. Healthcare terminology was the only portion of the course which was taught solely by CAI or videotape. Perhaps students could learn other nursing content just as well with CAI and videotape. If material to be learned is complex, perhaps CAI and videotape would be effective adjuncts to the teaching process. The nurse educator should consider the possibility of using CAI or videotape in courses or content of courses that previously had been taught by lecture.

A third implication focuses on the area of individualized instruction. In this study, subjects in both the CAI and videotape group listed the ability for self pacing and review as one of their likes about the learning medium. The student can stop, rewind or fast-forward the videotape as deemed necessary to learn content being presented. The computer also offers these capabilities as well as the added advantage of providing the student with immediate feedback and guidance throughout the lesson. Perhaps the nurse

educator should consider increased use of these learning media since self pacing was viewed positively by subjects.

A final implication of this study is in the area of student attitudes. The findings of this study revealed that there was not a significant correlation between attitudes towards the learning medium used and scores on the healthcare terminology posttest. Perhaps educators should keep in mind that while students had a fairly neutral attitude toward the learning media, learning was still present as evidenced by scores on the posttest and the final examination.

Additional analysis of subject's attitudes revealed that the subjects in the videotape group had a significant negative correlation ( $p = -.593$ ) between feeling competent in their knowledge of healthcare terminology after completion of this portion of the course and the scores on the final examination. The nurse educator should keep in mind that even though subjects felt that they were not competent in knowledge of the material presented in the videotapes, they did adequately learn this material as evidenced by the scores received on the final examination. Perhaps

students remember negative experiences.

Subjects in the CAI group had a significant positive correlation ( $p=.444$ ) between understandability of the learning medium and scores on the posttest. This group also showed significant positive correlations between the final examination scores and total score on the attitude survey ( $p=.569$ ), understandability of the learning medium ( $p=.564$ ), enjoyability in using the learning medium ( $p=.432$ ), convenience of the learning medium ( $p=.387$ ), wanting to recommend the learning medium to other students ( $p=.625$ ) and the belief that through using the learning medium their knowledge was increased ( $p=.461$ ). The nurse educator could consider increasing the usage of this learning medium since students reacted positively to its use.

#### Limitations of the Study

Several limitations of the study were evident. One limitation of the study was the mortality rate. Forty-one percent ( $n=20$ ) of the subjects withdrew during the course of the research study. As a consequence, those subjects left ( $n=31$ ) might not have been an accurate representation of the sample group as

a whole. The subjects who continued with the study might have been more motivated or more confident in their presumed knowledge of healthcare terminology.

The school of nursing where this study took place was initiating the computer laboratory simultaneously with this research. There were more hardware and software problems at this time than normally seen, possibly affecting the students ability to concentrate or adequately access the CAI.

A possible limitation to the study was the limited hours which were available for the subjects to access the computer laboratory and the library. Subjects had access to the CAI during daytime hours and one evening a week and access to the videotapes only during daytime hours. Subjects were taking support courses during the day in addition to the nursing course. The predominately daytime hours available to the subjects to view the CAI or videotapes coincided oftentimes with these support courses. Possibly if the hours available to the subjects to access these learning media had been extended, the results of this study might have been different. Because of these limitations, caution should be used in generalizing the results to other

student populations.

#### Recommendations for Future Research

Recommendations for further study include the following:

1. A replication of this study with a larger sample;
2. A replication of this study using more difficult nursing content;
3. An investigation measuring knowledge retention after an extended period of time, for example, after completion of the program;
4. An investigation correlating student characteristics, for example, age, gender, place of residence and previous computer experience, with the perceived benefits of CAI and videotape; and
5. An investigation correlating Kolb's learning styles with the perceived benefits of CAI and videotape.

#### Summary

The effects of CAI and videotapes on learning and knowledge retention of 31 beginning nursing students in a diploma school of nursing were examined. Student attitudes toward the learning medium used and scores on

the posttest were correlated. Students were randomly assigned to either a group using CAI or to a group using videotapes in learning healthcare terminology. The subjects completed an attitudinal questionnaire, a healthcare terminology posttest and a final examination. There was no significant difference in learning or knowledge retention between the students who used CAI and those who used videotape. No correlations were found between attitude toward the CAI or videotape and scores received on the posttest. These two learning media were effective in student learning. Implications of this research for nursing education and recommendations for future research were given.



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**Appendix A**  
Healthcare Terminology Posttest

## NURSING 100

### HEALTHCARE TERMINOLOGY

- I. The following are commonly used word roots and combining forms (a word root to which a final vowel, which is usually an o, is added). In the first group of questions circle the answer which best defines that root word or combining form.

1. cardi/o =
  - a. bone
  - b. skin
  - c. cell
  - d. heart
2. oste/o =
  - a. stomach
  - b. kidney
  - c. bone
  - d. heart
3. leukocyte =
  - a. white cell
  - b. red cell
  - c. blood cell
4. gastr/o =
  - a. intestinal
  - b. kidney
  - c. stomach
5. erythrocyte =
  - a. red cell
  - b. white cell
  - c. electrical
6. cyst =
  - a. bladder
  - b. intestine
  - c. vein
7. rhin/o =
  - a. skin
  - b. mouth
  - c. teeth
  - d. nose
8. hydr/o =
  - a. electrical
  - b. water
  - c. under
  - d. above
9. neur/o =
  - a. skin
  - b. muscle
  - c. bone
  - d. nerve
10. thorac =
  - a. chest
  - b. abdomen
  - c. front
  - d. midline

II. The following are examples of suffixes (word elements placed at the end of a word or stem, which serves to form a new word). For the following definitions, circle the correct suffix.

11. Inflammation of the heart:
  - a. gastralgia
  - b. cardiomegaly
  - c. carditis
12. Kidney disease:
  - a. nephropathy
  - b. nephritis
  - c. nephromalacia
13. The process of crushing a kidney stone:
  - a. thoracentesis
  - b. enterolysis
  - c. lithotripsy
14. Excision of a breast:
  - a. gastroplexy
  - b. mastectomy
  - c. colectomy
15. Decrease in blood cells:
  - a. leukopenia
  - b. hemiplegia
  - c. dermatosis
16. Surgical repair of the eardrum:
  - a. otitis
  - b. otoscopy
  - c. tympanoplasty
17. Difficulty with speech:
  - a. phonophobia
  - b. aphasia
  - c. dysphagia
18. Headache or head pain:
  - a. cephalgia
  - b. hemiplegia
  - c. cephlorrhea
19. Formation or presence of stones in the gallbladder:
  - a. nephrolithiasis
  - b. lipiditis
  - c. cholelithiasis

20. Paralysis on right or left side of the body:  
a. hemiplegia  
b. hemiptosis  
c. hemimetry

III. Please match the following suffixes with the correct meanings.

Term	Number
21. <u>itis</u>	1. disease
22. <u>o/megaly</u>	2. blood
23. <u>o/pathy</u>	3. pain
24. <u>emia</u>	4. inflammation
25. <u>algia</u>	5. softening
26. <u>malacia</u>	6. enlargement
27. <u>o/penia</u>	7. break or loosen
28. <u>o/lysis</u>	8. decrease, lack of
29. <u>iasis</u>	9. formation of
30. <u>o/ptosis</u>	10. droop, drop

IV. The following medical words are built on prefixes. Prefixes are always at the beginning of the word and modify (change) the words to which they are attached. Circle the number of each answer which best defines the word using the prefix.

31. tachycardia = a. rapid heart beat  
b. slow heart beat  
c. missed heart beat
32. aphonia = a. loud sound  
b. without sound  
c. soft sound
33. microcyst = a. small bladder  
b. small tumor  
c. microscopic organism
34. astrocytoma = a. water filled  
b. star shaped  
c. fatty tumor
35. dyspepsia = a. well-being  
b. painful digestion  
c. good digestion
36. eupnea = a. rapid heart rate  
b. normal respirations  
c. lack of respirations
37. myospasm = a. spasm of muscle  
b. spasm of intestine  
c. spasm of blood vessel

38. scleroderma = a. skin irritation  
b. hardening of skin  
c. eye disease
39. prenatal = a. before birth  
b. after birth  
c. before first birthday
40. endocranial = a. outside skull  
b. below the head  
c. within the skull

V. For each numbered specialist listed below, indicate the letter which most closely defines the field of study.

- |                             |                          |
|-----------------------------|--------------------------|
| _____41. cardiologist       | A. liver                 |
| _____42. gastroenterologist | B. eye                   |
| _____43. proctologist       | C. skin                  |
| _____44. psychiatrist       | D. heart                 |
| _____45. histologist        | E. kidney                |
| _____46. ophthalmologist    | F. diseases              |
| _____47. pathologist        | G. tissue                |
| _____48. hepatologist       | H. anus and rectum       |
| _____49. nephrologist       | I. abnormal behavior     |
| _____50. dermatologist      | J. stomach and intestine |
|                             | K. nose and throat       |

VI. In the following words look at the element word and then define the underlined word root.

Example: hypodermic = under

51. hypodermic =
52. nephrolith =
53. cystitis =
54. cholecyst =
55. hematocrit =
56. rhinoplasty =
57. pneumonitis =



58. hydrocephalic =
59. macrocyte =
60. autolysis =
61. dysphagia =
62. erythrocyte =
63. hematemesis =
64. hysterectomy =
65. hemiplegia =
66. oncology =
67. hydrophobia =
68. craniotomy =
69. arthritis =
70. antepartum =
71. oculist =
72. neurolysis =
73. tachypnea =
74. bradycardia =
75. gastromalacia =
76. enteritis =
77. aphasic =
78. arteriosclerosis =
79. endoscopy =
80. mammogram =
81. multicellular =
82. hematoma =
83. rhinoplasty =
84. thoracentesis =

- 85. blepharoptosis =
- 86. radiology =
- 87. aphonia =
- 88. hyperplasia =
- 89. colostomy =
- 90. neuralgia =
- 91. amenorrhea =
- 92. osteomyelitis =
- 93. dermatitis =
- 94. enterostomy =
- 95. leukopenia =
- 96. nephrectomy =
- 97. suprapubic =
- 98. hyperemesis =
- 99. neuralgia =
- 100. postoperative =

## **Appendix B**

### **Final Examination Terminology Questions**

11. Mr. Jones, who has a chronic lung problem, sleeps in the sitting position to ease breathing. This situation relates to:
- A. Orthopnea
  - B. Cyanosis
  - C. Tachypnea
  - D. Bradypnea
18. Your elderly client has multiple skin breaks which appear superficial. These would be termed as:
- A. Acne
  - B. Bruises
  - C. Abrasions
  - D. Dermatitis
20. Which of the following refers to an inflammation of the tongue?
- A. Stomatitis
  - B. Gingivitis
  - C. Glosstitus
  - D. Cheilitis
21. As part of your daily assessment you note the client has halitosis. This means the client:
- A. Is dehydrated
  - B. Has poor dental hygiene
  - C. Has impaired mucous membrane
  - D. Has an unpleasant breath odor
35. The client you are caring for has developed phlebitis. This condition indicates:
- A. Skin inflammation
  - B. Ear inflammation
  - C. Vein inflammation
  - D. None of the above
36. The prefix pneumo indicates a condition affecting the:
- A. Kidney
  - B. Heart
  - C. Lungs
  - D. Skin
37. The client is diagnosed as having hypothermia. This relates to body:
- A. Position
  - B. Size
  - C. Temperature
  - D. Functioning

38. Your client will undergo a gastrectomy. This procedure will involve the:  
A. Kidney  
B. Lung  
C. Gallbladder  
D. Stomach
39. A specialist who treats diseases of the kidney is a:  
A. Pathologist  
B. Gastro-enterologist  
C. Cardiologist  
D. Nephrologist

Match the following prefixes with the correct meaning.

- |           |            |
|-----------|------------|
| 40. Anti  | A. Bad     |
| 41. Noc   | B. Against |
| 42. Mal   | C. Night   |
| 43. Tachy | D. Rapid   |
44. Your client has had a colonoscopy. This indicates a:  
A. Surgical procedure removing the colon  
B. Surgical procedure for making an opening into the colon  
C. Procedure for examining the colon  
D. None of the above
48. The physician notes "the client is afebrile". This means the client:  
A. Has a flushed face  
B. Is sweating  
C. Is reacting to pain  
D. Has a normal body temperature

Questions 55-57 relate to the following situation:

You are caring for Mr. Jones, age 76. Your assessment data includes the following: temperature 98.4, apical pulse 110-irregular, respirations 24 and labored, blood pressure 156/94. Mr. Jones states he is having difficulty breathing and asks to sit up in bed.

55. According to the data available, you would say that Mr. Jones is:  
A. Febrile  
B. Afebrile  
C. Labile  
D. Pyrexia

56. Mr. Jones' respiratory pattern could be described as:
- A. Orthopnea
  - B. Apnea
  - C. Eupnea
  - D. Dyspnea
66. Of the following client needs, which would be considered top priority?
- A. Relief of boredom
  - B. Relief of dyspnea
  - C. Relief of headache
72. An accumulation of urine in the bladder with an inability of the bladder to empty fully describes which of the following conditions?
- A. Diaphoresis
  - B. Enuresis
  - C. Anuria
  - D. Retention
78. Your client, age 78, has been unable to defecate for several days. You note a continuous oozing of fecal material. These symptoms indicate:
- A. Flatulence
  - B. Incontinence
  - C. Impaction
  - D. None of the above

**Appendix C**

Attitudinal Survey  
(Evaluation of Learning Medium)

## EVALUATION OF LEARNING MEDIUM

The purpose of this survey is to obtain your feelings regarding the learning medium which you used in completing your study of healthcare terminology. Please rate the statements listed below according to the scale which follows. If you have any additional comments which you would like to make, please feel free to do so in the space provided.

Learning medium \_\_\_\_\_ Date \_\_\_\_\_

Rate according to the following scale:

- 5. strongly agree
- 4. agree
- 3. neutral
- 2. disagree
- 1. strongly disagree

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1. I was able to understand the material presented.   | 5 | 4 | 3 | 2 | 1 |
| 2. This learning medium was enjoyable to use.   | 5 | 4 | 3 | 2 | 1 |
| 3. This was a convenient learning medium to use.  | 5 | 4 | 3 | 2 | 1 |
| 4. The learning medium progressed at a pace which fit my needs.   | 5 | 4 | 3 | 2 | 1 |
| 5. I believe I am competent in my knowledge of healthcare terminology after using this learning medium. | 5 | 4 | 3 | 2 | 1 |
| 6. I would like to use more of this type of instruction in the future.                                  | 5 | 4 | 3 | 2 | 1 |
| 7. I would recommend this learning medium to other students.  | 5 | 4 | 3 | 2 | 1 |
| 8. I believe this learning medium helped me learn.  | 5 | 4 | 3 | 2 | 1 |

Things I liked most about this learning medium:

Things I liked least about this learning medium:



**Appendix D**  
**Demographic Data Questionnaire**

DEMOGRAPHIC DATA

NAME \_\_\_\_\_

GENDER \_\_\_\_\_ AGE \_\_\_\_\_

PLACE OF RESIDENCE \_\_\_\_\_

PREVIOUS COMPUTER EXPERIENCE \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Appendix E**  
Permission from Institutions

To be completed by the Investigator:

Date Submitted: 6-28-91

Proposal Title: A COMPARISON OF THE EFFECTS OF TWO LEARNING MEDIA ON LEARNING, KNOWLEDGE RETENTION AND ATTITUDE

Investigator: LYNN A. HOWARD

Faculty research advisor (for student research): DR. BARBARA HARG

Return to: LYNN A. HOWARD

Name

412 29th ST.

Street Address or Campus Office

WEST DES MOINES, IA 52245

City, State, Zip if off campus

To be completed by the Human Subjects Research Review Committee Chairperson:

Date Received: 7/8/91

Decision:

Approval, no risk

Approval, minimal risk

Approval, subjects at risk, but benefits outweigh risks

No approval. Subjects at risk or proposal does not adequately address risks, benefits and procedures.

Reasons for Disapproval:

Suggested Changes:

please note suggested changes attached.

Human Subjects Review Committee Chair: Hilda L. Williams (1990-1991)

91-92

Date: 26 July 91

**Appendix F**  
Introductory Letter

I am Lynn Howard, R.N., a graduate student in nursing at Drake University and a faculty member at the Mercy School of Nursing. As part of my graduate work I am studying the differences in learning in students who use computer assisted instruction and those who use videotapes. This study will also explore your attitude toward either computer assisted instruction or videotapes as a learning medium.

I am requesting your participation in this study. In agreeing to participate in this study you will be randomly assigned to either a group receiving computer assisted instruction or to a group receiving videotapes. You will complete a brief attitudinal survey regarding the computer assisted instruction or videotapes and will complete tests on healthcare terminology.

The tests you will be taking as a participant in the study are the same ones that the students who do not agree to participate will be taking. Both the computer assisted instruction and the videotapes address content which will be on the tests.

Since this study will be measuring learning in conjunction with the instructional method used, as a participant in this study you are requested not to share material with other students. Learning will be determined by your normal nursing course examination scores.

All data obtained from you during this study will be kept confidential and accessible only to the principal investigator and her assistants. Participation in this research study is voluntary. You have the right to refuse to participate and the right to withdraw at any time without jeopardy to your course grade.

If you have any questions you may call me at 224-4846.

-----  
Your signature below indicates that you have read the above information and agree to participate in the study. You may withdraw from the study at any time after signing this form without prejudice or jeopardy to your course grade.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

By providing my printed name and address I am indicating that I would like to receive a summary of the results of this study upon its completion.

Name (please print) \_\_\_\_\_

Mailing address \_\_\_\_\_

City, State, Zip Code \_\_\_\_\_